



# *AO Cost Simplification*

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# General Philosophy of the Cost Section



- The Goal is to convey cost realism and reasonableness
- The complexity and requirements of the cost section should be scalable and consider:
  - Range of AO Mission Values

SMEX	Discovery / Mars Scout	New Frontiers
\$100M	\$400M - \$600M	\$900M

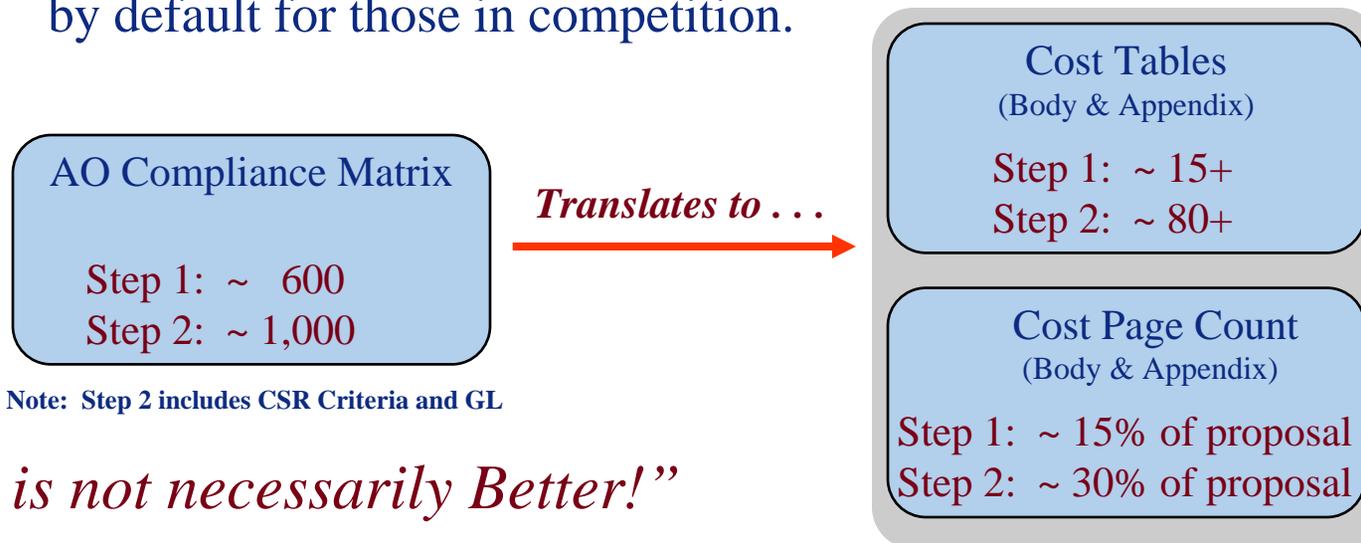
- The Differentiation between Step 1 and Step 2

	Maturity	~ Time	Investment
Step 1	Pre Phase A	90 days	During Step 1 the amount of B&P funds a proposal team spends is a fraction of 1% of the mission value.
Step 2	Concept	4 - 9 months	By the end of Step 2 the combined total investment by NASA and the proposal team still amounts to no more than 1%.



# Forensic Look at AO Requirements

- Currently, AOs are structured to promote precision in cost without necessarily ensuring accuracy
- How much information is required to illustrate cost realism and reasonableness?
  - Need a clear delineation of cost compliance items (e.g., tables required, level of detail, back-up information)
  - Items that are deemed optional translate to mandatory requirements by default for those in competition.

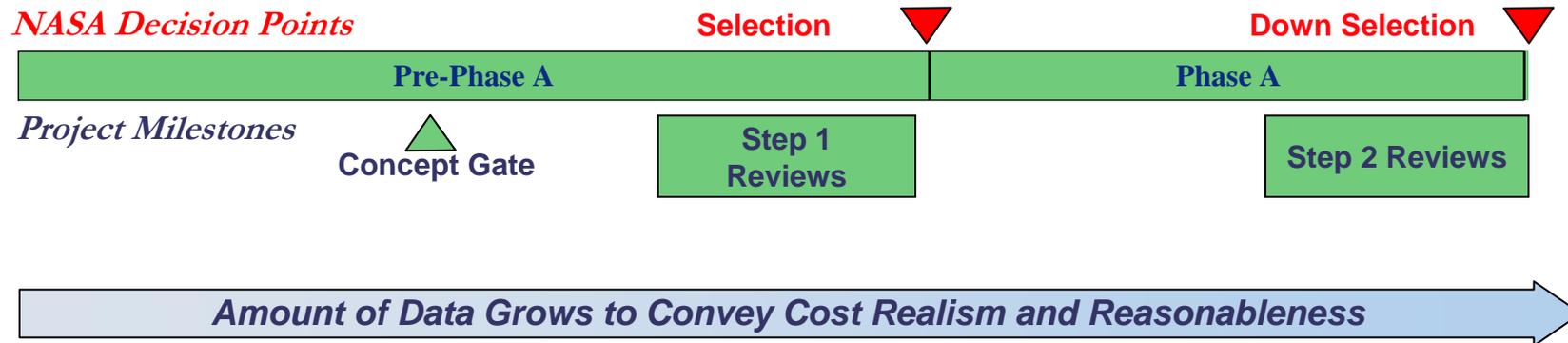


*“More is not necessarily Better!”*



# Lifecycle of a Proposal

## AO-Driven Missions Notional Timeline



- Minimal**
- AO Cost Requirements
  - Tables

- Expanded**
- AO/CSR Cost Requirements
  - Tables



# Goal for Simplification of Cost Section

- Establish a format that will enable the proposer to convey to the evaluator in a straightforward approach cost realism and reasonableness
  - Standard yet scalable AO Requirements
  - Enabling tables
  - Cost Risk Methodology
  - Basis of Estimate (BOE)
  - Key Cost Drivers
  - Cost & Pricing Data Validity
- Create a grab bag approach utilizing a standard set of required templates and information based on the size and complexity of the solicitation





# Grab Bag Approach



## *Notional application of the grab bag approach*

Detail required increases with complexity →

Basic Set of Tables for Evaluation Purposes	SMEX	Discovery	Mars Scout	New Frontiers
<b>Step 1 Tables:</b>				
Table A - Cost Time phased by WBS 2	X	X	X	X
<b>Step 1 Instructions:</b>				
Instruction 1 - TBD	X	X	X	X
Instruction 2 - TBD		X	X	X
Instruction 3 - TBD				X
<b>Step 2 Tables:</b>				
Table A - Cost/WF Time phased by WBS 3	X	X	X	X
Table B - TBD		X	X	X
Table C - TBD				X
<b>Step 2 Instructions:</b>				
Instruction 1 - TBD	X	X	X	X
Instruction 2 - TBD		X	X	X
Instruction 3 - TBD				X
Instruction 4 - TBD				X
Instruction 5 - TBD				X



# Key Concerns

*Certain requirements or elements there of cause proposal teams additional work, confusion, consternation with what appears to be little value added to the evaluator*

Cost Risk Assessment (Use of S-Curves)
Fiscal Year vs. Real Year Cost Cap
Cost Compliance Clarity
Align Cost Tables with NASA Standard WBS
Step 1 Cost Requirements
Separate Selection from Procurement
Early Release of Key AO Details
Funding Profile Requirements
Step 2 Required Cost Tables
Step 2 Cost Traceability Requirements
Cost Terminology
Use of Reserves relative to Modeled Costs



# Cost Risk Assessment (Use of S-Curves)

- Issue:
  - A high confidence estimate is being asked for when the state of knowledge of the proposed design is least mature
  - The objective of cost risk assessment is to:
    - Identify the set of factors representing the underlying risk
    - Establish aggregate Project Reserve levels
    - Enable sensitivity analysis (risk increasing or risk reducing)
  - The requirement in the AO is not defined and confusing
    - Estimate Range (high, low) or S-Curve
    - Integration of S-Curve and cost capped missions
- Suggested Solution(s):
  - Eliminate the use of the S-curve in the Step 1 proposal.
  - For Step 2, use the S-curve on models to bound the proposed cost estimate. (i.e., ICE to the 70% confidence level to bound the proposed cost estimate)



# Fiscal Year vs. Real Year Cost Cap

- Issue:
  - Since the government plans and authorizes funding in terms of real year dollars (RY\$), and since all proposing organizations estimate in terms of RY\$, cost caps should be expressed in RY\$. Cost caps should NOT be given in fixed year dollars (FY\$).
    - If cost caps are given in both FY\$ and RY\$, then differences between the NASA inflation indices and organizations' approved forward pricing rates will cause discrepancies between the two caps.
- Suggested Solution(s):
  - State cost caps only in terms of RY\$
  - In order for NASA to weigh ROIs between various proposals, it is still OK for NASA to ask for total FY costs, but due to the use of approved forward pricing rates from various team partners, and the possibility of introducing errors in the inflation/deflation calculations, it should be noted that the total FY costs may only be approximate and are for comparative purposes only.



# Cost Compliance Clarity

- Issue:
  - How much information is required to illustrate cost realism and reasonableness? Items that are deemed optional translate to mandatory requirements by default for those in competition.
    - For example, the recent Step 1 SMEX AO optionally requests the MEL, WBS, WBS Dictionary, WBS Cost Table, and Basis of Estimate (BOE) details.
    - This level of cost detail implies a level of cost precision that is not commensurate with 1) maturity of the mission concept as then understood, or 2) the amount of money that has been spent developing the mission concept and cost estimate.
- Suggested Solution(s):
  - At a minimum, establish how much information is required to illustrate cost realism and reasonableness
  - Provide a clear delineation of cost compliance items (e.g., tables required, level of detail, back-up information)



# Align Cost Tables with NASA Standard WBS

- Issue:
  - The required structure of the Cost Section does not provide a structure to establish cost realism and reasonableness by WBS work element.
    - In addition to the proposer’s WBS, the current cost requirements make use of a “pseudo-WBS” consisting of diverse elements such as instrument costs, Phase A costs, launch ops costs, DSN costs, various flavors of reserves, etc. (i.e., Table B-1).
    - Use of these two WBSs creates more work for proposers and can lead to the introduction of errors when trying to translate between them, and provides no additional insight in to the proposed cost.
- Suggested Solution(s):
  - Eliminate the use of the “pseudo-WBS.”
  - Structure the cost section to request cost information by WBS work element consistent with the NASA Standard WBS, so as to be more in alignment with the NASA Cost Estimating Handbook.



# Step 1 Cost Requirements

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- Issue:
  - The cost requirements are inconsistent with a Step 1 solicitation. Cost details are asked for early in the lifecycle when cost is not a commitment. For example:
    - SMEX AO, Section 8.2.4, “The single biggest item that reduces cost risk is a complete and detailed basis of estimate, including complete cost model input data, vendor quotes, comparisons to similar analogous missions, etc.”
- Suggested Solution(s):
  - Traditionally, this level of detail is required when making a cost commitment and should not be required in a Step 1 proposal.



# Separate Selection from Procurement

- Issue:
  - Currently AOs require details regarding both selection (based on the stated selection criteria) and on procurement issues. The latter is only needed if a proposal passes the selection gate. As such, proposal teams must spend significant resources developing procurement-related data without the assurance of being selected.
    - AOs currently do not require submission and certification of Phase A cost or pricing data in Step 1 proposals, but instead require this information after selection for Step 2, thereby separating the selection and procurement processes for Phase A (see App. A.VI of any AO).
- Suggested Solution(s):
  - Completely separate the selection and procurement processes for both Step 1 and Step 2.
  - This would be a significant paradigm shift (and perhaps legal change) in the current proposal process. Nevertheless, NASA should pursue this as it would result in significant simplifications to the proposal process.



# Early Release of Key AO Details

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- Issue:
  - Late dissemination of cost cap, schedule, and basic characteristics of the AO does not allow potential bidders to preplan prior to the release of the draft AO
- Suggested Solution(s):
  - Well in advance of the draft AO, information should be disseminated to reflect the basic structure of the AO (cost cap, cost profile, schedule, characteristics)



# Funding Profile Requirements

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- Issue:
  - The proposer should provide the funding profile commensurate with the proposed mission lifecycle
    - This may result in unrealistic burn rates at inappropriate times, or to unusable fund late in the mission's lifecycle.
- Suggested Solution(s):
  - Eliminate the funding profile as a requirement
  - Alternatively, provide a percentage profile by lifecycle phase. This allows the proposer to phase by year based on schedule.



## Step 2 Required Cost Tables

- Issue:
  - Step 2 proposals require a number of cost tables and data that require a tremendous amount of effort (and paper) to produce, yet provide no additional insight into the proposed cost. For example:
    - Estimation of recurring and non-recurring costs (there are no recurring costs in one-of-a-kind developments)
    - Rates and factors (not necessary for the purpose of evaluation and selection)
- Suggested Solution(s):
  - The recurring and non-recurring split would only be required if the proposed project had identical recurring units of 3 or more.
  - Eliminate the request for rates and factors



## Step 2 Cost Traceability Requirements

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- Issue:
  - Cost requirements that are included in multiple sections of the Step 2 Criteria and Guidelines
    - Section G - Management Plan
    - Section H - Phase B Plan
    - Section J - Cost Information for Phase A through E
    - Section L - Appendices (L.14- Cost and Pricing for Phase B Contract; L.15 - Additional Cost Data to assist Validation)
- Suggested Solution(s):
  - Streamline and consolidate the cost requirements in one section of the Criteria and Guidelines for the Phase A Concept Studies document



# Cost Terminology

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- Issue:
  - The cost section instructions need to specify exactly what the cost description/terminology intends. These can mean different things to different people. (e.g., basis of estimate, priced option, bridge phase)
- Suggested Solution(s):
  - Ensure cost instructions and terminology is used consistently with proper definition
  - Use industry standard and/or FAR terminology and definition
  - Provide a glossary that clearly defines cost terminology being used



# Use of Reserves relative to Modeled Costs

- Issue:
  - NASA cost reviewers compare the proposed cost (including reserves) to modeled costs (with reserves added to the modeled costs).
    - However, cost models are built using actual expenditures from past projects.
    - These actual expenditures include the expenditure of reserves. Adding reserves to modeled costs then results in double bookkeeping of reserves on the part of the modelers.
- Suggested Solution(s):
  - When cost reviewers do cost comparisons with parametric cost models, the proposed costs with reserves should be compared to the modeled costs without any additional reserves.



# Recommendations

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- HQ to form a tiger team (near term) to establish and vet requirements, guidelines and templates and address specific issues raised at this workshop such as:
  - AO Requirements
  - Tables
  - Cost Risk Methodology
  - Basis of Estimate (BOE)
  - Key Cost Drivers
  - Cost & Pricing Data Validity